BIODIESEL
TM by the National Biodiesel Board

Biodiesel...a Review for Clean Cities Coordinators: The Good, the Bad, and the Ugly about Biodiesel

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Washington DC

Biodiesel—The Good

- High Cetane (avg. over 50)
- Ultra Low Sulfur (avg ~ 2 ppm)
- High Lubricity, even in blends as low at 1-2%
- High Energy Balance (3.2 to 1)
- Low Agriculture Inputs: Soybeans
- 78% Life Cycle C02 Reduction
- Renewable, Sustainable
- Domestically Produced
- Reduces HC, PM, CO in existing diesel engines
- And reduces NOx in boilers and home heating

Biodiesel—The bad

- Poorer cold flow properties with high blends
- Slight NOx emissions increase with existing diesel engine technology (EPA engine dyno protocols)
  - NOx reductions for boilers and home heating oil
  - NOx reduction or neutral in chassis dyno emissions
- Higher price (without tax incentive)
- Questions about fuel stability
- Questions about blending best practices
  - At the terminal
  - Downstream (i.e. splash or self blending)
- ALL being addressed by industry programs

Biodiesel—The Ugly

October MN Waiver of B2

- B100 Flash above 100C but below 130C found in terminals:
  - Flint Hills—2 terminals
  - Magellan—3 terminals
  - Marathon—none (were back running B2 Oct 28)
- Flash point used to control methanol content to 0.2% maximum
  - 100C controls methanol and is intended spec
  - Spec set at 130C to insure value is really 100C
- <u>At no point was there a safety or vehicle performance issue associated with this incident</u>

October MN Waiver of B2

- Root cause:
  - Flash point is highly variable around 100C
  - Real biodiesel flash points below 130C leaving the biodiesel plant gate
  - Lack of flash point testing downstream
  - Lack of ability of Minnesota enforcers (W&M) to run biodiesel tests in their own laboratory
  - Possible low level contamination with low flash material in shipping/blending (i.e. gasoline, back haul alcohol) that is OK with diesel fuel since its flash point spec of 52 C minimum

Temporary MN Waiver of B2

- MN Weights and Measures Interprets Law:
  - ASTM spec applies at the plant gate (i.e. 130C)
  - Downstream can be 100 C minimum as long as flash point at the gate is 130 C
    - Until ASTM changes specification
- NBB Supported Action of Minnesota W&M
  - ASTM specs must be adhered to
  - Rather not have biodiesel than allow the use of out of spec product
- Biodiesel product replaced, mandate back in effect Wednesday November 9

MN Waiver—Dec 23, 2006

- Increased incidence of fuel filter clogging
- Some related to ‘normal’ diesel issues
- Some ‘Vaseline’, butterscotch pudding, white gel
  - Not typically found with diesel fuel
- Biodiesel was found to be out of specification for un-reacted or partially reacted oils and fats in truck retain samples received at major terminals

MN Waiver—Dec 23, 2005

- It is well known that out of specification biodiesel for un-reacted and partially reacted oils/fats (out of spec waxes) can cause problems:
  - Filter clogging
  - Long term fuel system fouling
- NOT a cold flow issue
  - It was an out of spec issue
  - But problems are exacerbated by cold temps

MN Waiver—Dec 23, 2005

- NBB and Minnesota Biodiesel Council (MBC) recommended 15 day waiver to allow time to remove out of spec fuel and re-supply
- MN Dept of Commerce issued 21 day waiver of B2 requirement until Jan 13
- NBB and MBC recommended 30 day extension to ensure all product replaced, additional quality controls in place
- Waiver back in effect Feb 10

MN Waiver—Dec 23, 2005

- NBB highly recommends BQ-9000 quality program for biodiesel companies
- If all companies were BQ-9000 the Dec 23 MN waiver would not have happened
- NBB asks all engine and vehicle companies—and Clean Cities Programs—to join NBB in strongly encouraging the BQ-9000 quality program be adopted industry wide
- BQ-9000 companies, ASTM spec product

BQ 9000 Accreditation Mark

- ASTM spec product
- BQ-9000 companies

- NBB highly recommends encouragement of BQ-9000 in purchasing specs and bid contracts
- Spread the word on ASTM specs and BQ-9000!

ASTM Current Status

- ASTM D 6751 is the approved standard for B100 to be used for blending in the US
- ASTM D 6751 has two grades
  - S500
  - S15
- Currently balloting:
  - Changes/Improvements to D 6751
    - Stability, 2007/2010 Engine Needs
  - Allowance of up to B5 in D 975
  - Stand alone finished blend B20 specification

Blended Fuels and Alternative Fuels within ASTM D 975

- Subcommittee E agreement June/Dec 2005
- Identifies ASTM spec the blend component must meet
- Specifies upper limit of component allowed
- Sets test method for determining the level of the component in the finished D975 blend
- Use existing test methods and limits for D 975
- Expanding limits or test method is NOT OK, unless OK for all D 975 fuel
- Can’t use ‘buyer/seller’ clause to expand limits or methods

D 975 Blended and Alt Fuels

- Sets important precedent for Subcommittee E
- There are a growing number of new companies claiming their ‘renewable fuel’ can be blended with diesel fuel and meets ASTM D 975 specifications
  - No ASTM specification for the blend component
  - Finished fuel meets all properties of Table 1, D 975
- Several known examples of companies selling raw vegetable oil as blending component—not claiming to be biodiesel—as D 975 compliant fuel
- These blended fuels DO NOT MEET ASTM D975

New NBB Educational Materials

- Troubleshooting Brochure
- Troubleshooting CD Available
- Considerations for blends higher than B20

- NBB applauds the efforts of the Clean Cities Coordinators and DOE Leadership!
- NBB looks forward to an even closer working relationships with Clean Cities!

US Biodiesel Industry Direction

- B2 as the preferred lubricity component for 2006 Ultra Low Sulfur Diesel fuel
- B5 in home heating fuel
- B20 in niche markets
  - Government Fleets
  - School Buses
  - Garbage Trucks
  - Mines
  - Agriculture
  - Stationary Electricity Generation
  - Others????

NBB Future Vision, June 2005

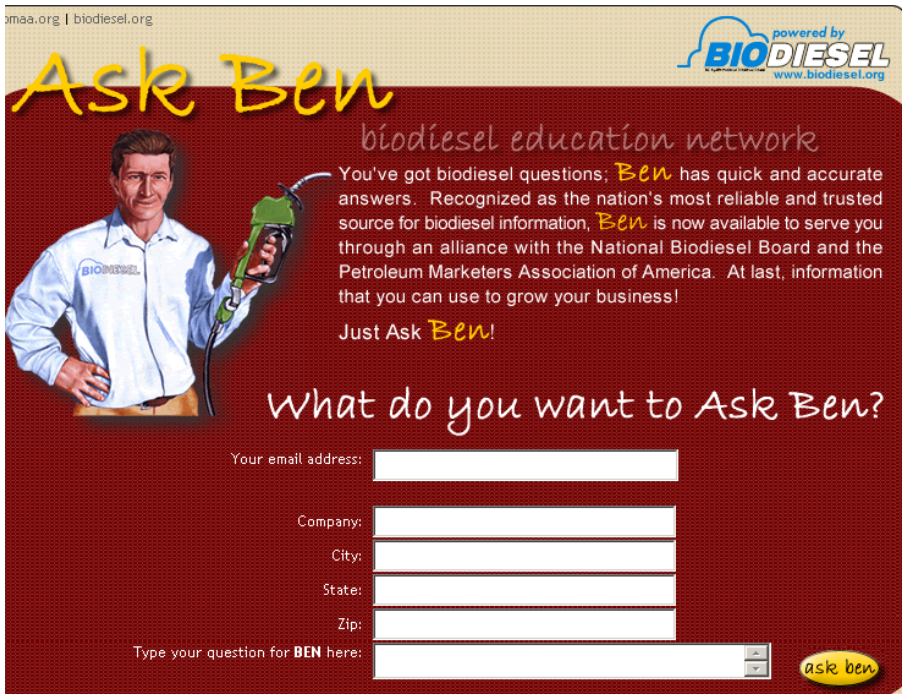
- To increase the demand for commercially produced biodiesel in the United States through education, communication, and quality assurance programs and by serving as the national coordinating entity and clearinghouse of information
- Goal: 1 billion gallons of B100 sales, mostly as blends, by 2015

Biodiesel: U.S. Looking Forward

- NREL Biomass Oil Analysis: Research Needs & Recommendations, June 2004
- Current Potential: 1.7 Billion gal/year
  - 5.5% of national on-hwy. demand
- Near-Term Potential: (2015): 3.5 Billion
  - 6.8% of national on-hwy. demand in 2015
- Long-Term Potential: (2030): 10 Billion

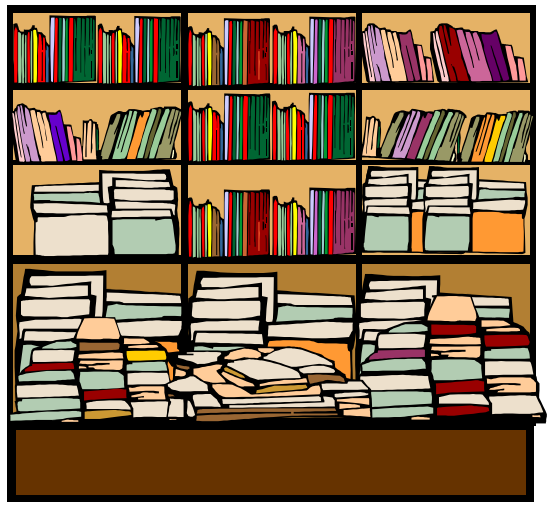
Educational Resources

- BEN: Biodiesel Education Network
- Web-based resource specifically for petroleum marketers
- Partnership between NBB/PMAA
- www.pmaa.org
- www.biodiesel.org



NBB Resources

- www.biodiesel.org
- Technical Library
- Biodiesel Bulletin
- Educational Videos Available
- Informational Resources
- Technical Resources
- On-line Database & Spec Sheets



Other web sites:

- www.nationalbiodieseleducation.org
- www.nationalcleancities.org

Other Biodiesel Resources

- www.bbibiofuels.com
- Biodiesel Magazine
  - A **MUST HAVE'** magazine
- Biodiesel Industry Directory On-Line